defibrillator is present, takes precedence over intubation, intravenous line placement and even CPR. The use of sodium bicarbonate is deemphasized and is merely considered rather than recommended well into the resuscitation. For asystole and electromechanical dissociation, the use of calcium has been eliminated.

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Expanding the Use of Automatic External Defibrillators to Home and Community

THE SINGLE most effective intervention in cardiac arrest occurring outside the hospital is early external defibrillation. The problem is that ventricular fibrillation is a very transient rhythm, lasting only a few minutes before it decays to asystole, from which virtually no one can be resuscitated. A major thrust in emergency medicine has been to develop ways to get a defibrillator to a patient in cardiac arrest as quickly as possible. Paramedics in mobile coronary care units were, in their original conception, "invented" so that they could carry defibrillators to such patients. Next, emergency medical technicians (EMTs), less well trained than paramedics but more than ten times as plentiful, were trained to identify ventricular fibrillation and to deliver a defibrillatory shock when they discovered a patient in that rhythm. The problem still remains, however, that emergency personnel can take a long time to get a defibrillator to a patient's side.

The rationale behind early defibrillation strongly suggests that the immediate witnesses of an arrest, bystanders, family members and colleagues at work should also be given defibrillators. Unfortunately, interpreting cardiac rhythms and operating a sophisticated medical device are beyond the ability of most laypersons and even some less-experienced emergency personnel.

Since the late 1970s several companies have worked to develop portable battery-powered defibrillators that could automatically analyze a patient's cardiac rhythm for the presence of ventricular fibrillation. If fibrillation occurs, the devices, called automatic external defibrillators, charge their capacitors and deliver an electrical countershock.

At this time, these defibrillators are being evaluated in several settings. Researchers have studied their use in the homes of patients who have survived either a cardiac arrest or a myocardial infarction. Their work has confirmed that family members of a high-risk patient can be successfully trained to operate an automatic external defibrillator, that they can retain this knowledge over long periods of time and that they will successfully use the device when an actual cardiac arrest occurs.

Fully trained paramedics can diagnose dysrhythmias, insert intravenous lines, administer medication and carry out defibrillation. While lesser-trained EMTs generally lack these skills, they are much more numerous than paramedics and can usually reach a patient more rapidly. The use of automatic external defibrillators by EMTs may partially compensate for their lesser amount of training because rhythm recognition is done by the device, rather than by emergency personnel. Two large controlled trials have confirmed the value of their use by EMTs.

Placing automatic external defibrillators in public settings is another strategy to achieve rapid defibrillation after a cardiac arrest. Researchers are currently conducting evaluations of such placement in senior centers, community health clubs, high-rise office buildings and large corporate settings.

Methods to deal with medical emergencies in the air have remained controversial and hotly debated. One major airline has embarked on a two-year evaluation of the use of automatic defibrillators by trained cabin-crew members in wide-body aircraft that fly international routes.

During the next decade, automatic defibrillators will become smaller, less expensive, safer and more accurate. They are clearly a device of the future.

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Advances in Radiologic Evaluation of Acute Spinal Cord Compression

ACUTE SPINAL CORD compression in cancer patients is a true oncologic emergency. Without prompt intervention, potentially reversible neurologic damage will become permanent. Although direct parenchymal metastatic invasion of the spinal cord is rare, most cancer patients with cord compression present with spinal epidural metastases from the direct spread of vertebral or paravertebral lesions.

While neurologic examination and plain radiographs help to localize the level of the lesion, myelography, using either iophendylate (oil-based), metrizamide (water-soluble) or both as contrast, has been the standard radiologic examination. By using sagittal projection, several levels of obstruction can be visualized simultaneously and spot radiography limits motion artifact. The procedure is invasive, however, often requiring two punctures above and below the lesion to define the extent of obstruction. As only the outline of the soft tissue is visualized, the actual extent of a paravertebral lesion cannot be seen.

The development of high-resolution computed tomography (CT) allows for greater distinction between bone and soft tissue. The transverse view of the spine provides visualization of the perispinal area, allowing a view not only of impingement of the cord but also the extent of epidural metastases. The procedure is noninvasive and requires no contrast material, but within the confines of the spinal canal there is poor resolution between the cord and the subarachnoid space.

A solution to this problem is the use of water-soluble metrizamide contrast with computer-assisted myelography. This improves differentiation between the soft tissues, and transverse views better show the extent of cord compression than does myelography. As smaller amounts of metrizamide

are detected by CT, what appears to be a complete block on routine myelography is often shown to be incomplete with computer-assisted myelography, thus obviating the need of a second puncture above the lesion. This greater sensitivity also allows for the use of smaller doses of metrizamide, particularly important in evaluating upper cord lesions that have the added risk of seizures due to contrast material.

Still, the use of computer-assisted myelography is not without its disadvantages. The procedure is invasive, requires contrast, exposes a patient to radiation and is limited to transverse projection.

Although in its relative infancy, magnetic resonance imaging (MRI) provides a new and in many ways superior evaluation of cord compression. The spine can be seen in both the sagittal and transverse projections. Abnormalities in cord diameter and contour are easily seen. Differences in soft-tissue densities are better delineated. As such, MRI is as accurate as CT and myelography in showing the cranial and caudal levels of obstruction without the invasive use of contrast material or exposure to radiation.

MRI, however, is not without its limitations. Slice thickness, although improving, is still quite large compared with CT. The procedure is relatively lengthy, and patient handling is more difficult in the confined spaces of MRI. Patients requiring advanced life-support equipment or cardiac pacemakers cannot be studied. Nevertheless, as technologic advances correct these limitations, MRI shows great potential as the diagnostic tool of choice in the evaluation of spinal cord compression.

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Computed Tomography Versus Peritoneal Lavage in Blunt Abdominal Trauma

PERITONEAL LAVAGE has for years been a useful technique in the evaluation of blunt abdominal trauma. Recently, however, computed tomography (CT) has gained favor and in many institutions has replaced lavage as the most frequently used modality.

Three questions are crucial to the evaluation of blunt abdominal trauma: (1) is blood present? (2) how much blood is present? (3) what organs are damaged? Tomography is superior to lavage in answering questions 2 and 3 and has some advantages relative to question 1.

Is blood present? Lavage is very sensitive in diagnosing intraperitoneal blood. Many studies have indicated that CT is equally sensitive, although some recent articles discussed below have questioned its reliability. There is no question, however, that lavage does not detect retroperitoneal hemorrhage, whereas CT does. Moreover, unlike CT, lavage may yield false-positive results due to either a traumatic tap or dissection of retroperitoneal blood into the peritoneal cavity through torn fascial planes.

How much blood is present? While lavage may detect intraperitoneal bleeding, it may not be very accurate in measuring the amount of free blood. Many clinically stable patients who might undergo laparotomy based on abnormalities detected by lavage can avoid surgical intervention if intraperitoneal bleeding is estimated to be relatively minor based on CT findings. In two studies, 60% of patients with liver lacerations and 79% of children with splenic injury were spared laparotomy.

What organs are damaged? Lavage offers no information regarding the specific organ(s) damaged. CT is quite sensitive and specific for the most frequently injured organs: liver, spleen and kidney. It is less sensitive for bowel and pancreatic trauma, but can often detect injuries to these organs as well.

Tomography does require time and is indicated only for patients who are hemodynamically stable. Unstable patients with obvious abdominal injuries should be taken directly to the operating room. Results of a previous lavage may be useful in confirming free intraperitoneal bleeding in such patients if there is any question.

While a number of studies have indicated nearly 100% sensitivity of CT in detecting clinically significant intraperitoneal bleeding, several recent articles have reported dramatically less sensitivity. The discrepancy between results from reputable trauma centers is disturbing and indicates that the issue has not yet been resolved. It is suggested that relying on CT alone in institutions with relatively little experience is not advisable. Yet the reports from some major trauma centers suggest that in hospitals with sufficient volume, CT may prove to be the most useful method for evaluating blunt abdominal trauma. Even one of the articles casting doubt on the reliability of CT states that if experienced CT interpretation is immediately available to determine the need for laparotomy, CT may be equal in sensitivity to lavage. Regardless of how the issue is ultimately resolved, however, there is no question that peritoneal lavage will always have an important role.

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Digoxin-Specific Fab Fragments

THE DEVELOPMENT of digoxin-specific antibodies has provided a significant therapeutic option for the treatment of digitalis intoxication. Hitherto experimental and available only at a limited number of centers, digoxin-immune Fab (Digibind) has been commercially released within the past year. The antibodies are produced by immunizing animals with digoxin coupled to a protein carrier, removal of serum, enzymatic digestion of the immune complex and separation of the digoxin-specific Fab fragments. Administered intravenously, the fragments bind to digoxin, rendering it pharmacologically inactive.

Fab fragments should be administered to a patient with digoxin or digitoxin intoxication who exhibits serious cardiac rhythm disturbance, hyperkalemia or both. Mild to pro-